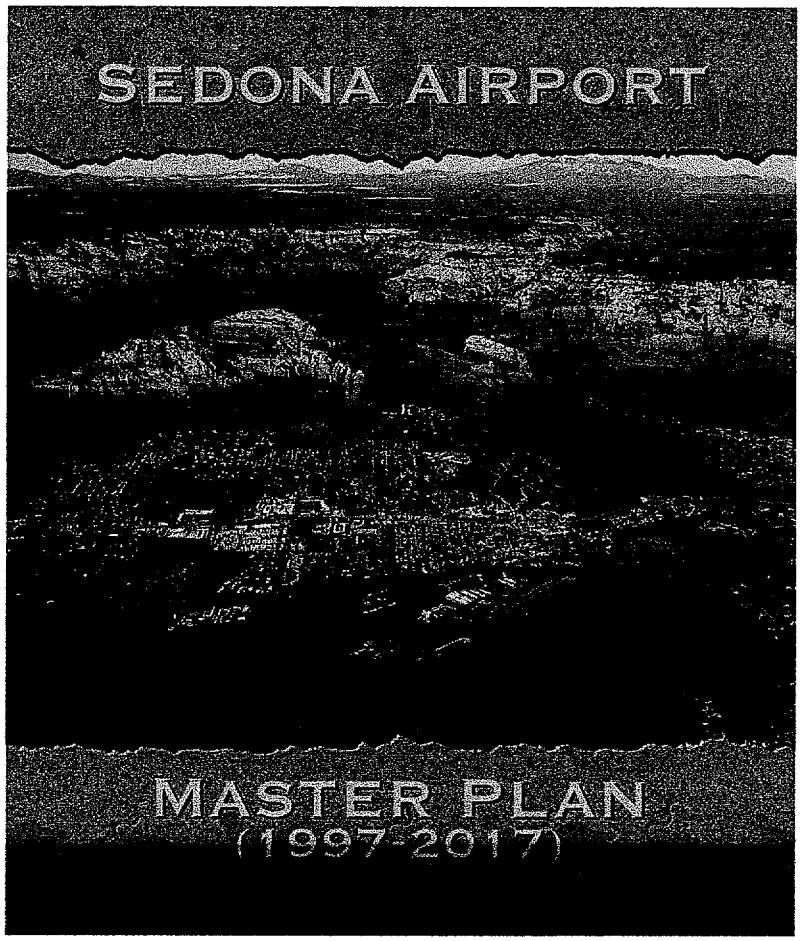

FACILITY REQUIREMENTS

Chapter 4
FACILITY REQUIREMENTS

4.1 INTRODUCTION

This chapter uses the results of the aviation demand forecasts developed in the previous chapter to determine the future airport facility requirements.

Established planning criteria have been applied to the various demand parameters to determine the specific facility requirements for both airside and landside elements of the airport. It is also intended to identify in general terms the deficiencies in existing facilities and outline what new facilities will be needed to accommodate forecast demands.

It is important to note that Sedona Airport has development plans underway which, to some extent, have been considered in the facility requirements analysis presented here. Since this analysis is quantitative only, the next step, alternative analysis, will look at the possible physical layouts to accommodate the calculated requirements. At that point, a refinement of the calculated facility requirements will be accomplished based on functional location and layout.

4.2 AIRSIDE FACILITY REQUIREMENTS

Airside facility requirements include those facilities directly related to the arrival and departure of aircraft:

- Runways
- Taxiways
- Airfield Navigational Aids, Lighting and Markings

The selection of the appropriate Federal Aviation Administration (FAA) design standard for the development of airfield facilities is based primarily upon the characteristics of the most demanding aircraft expected to use the airport. The most critical characteristics are the approach speed and the wingspan of the aircraft anticipated to use the airport both today and in the future. The planning for future aircraft use is particularly important because design standards are used to plan separation distances between facilities that could be costly to relocate at a later date.

Based on a review of the aircraft forecast to operate at Sedona, the Aircraft Approach Category is B and the Airplane Design Group is II. This combination, B-II, forms the FAA alphanumeric Airport Reference Code (ARC) for Sedona described here.

- Approach Category: As per 'Airport Design,' FAA Advisory Circular 150/5300-13, aircraft are grouped into five categories based upon their certified approach speed. These categories range from Category A for slower single engine piston aircraft, to Category E for supersonic jet aircraft. Approach Category B includes aircraft with landing approach speeds of less than 121 knots.

- Design Group: The same advisory circular also defines six Airplane Design Groups (ADG's) according to the physical size of the aircraft. The airplane's wingspan is the principal characteristic affecting design standards. Airplane Design Groups range from Group I for small aircraft with wingspans less than 49 feet to Group VI for the largest cargo aircraft. Aircraft in Airplane Design Group II includes aircraft with wingspans up to 79 feet.

Furthermore, the *National Plan of Integrated Airport Systems (NPIAS)* classifies the Sedona Airport as a General Utility Airport, as described earlier in the Inventory Chapter. The forecasts of future general aviation activity at the Sedona Airport indicate that the airport should continue to be planned as a ***General Utility Airport.***

Airport design specifications are more specifically determined by analyzing the aircraft mix and determining the most demanding aircraft to be accommodated. Although one aircraft may determine runway length, another may define runway pavement strength or other appropriate design parameter. The following paragraphs detail the criteria used to establish airfield dimensions, capabilities, and requirements.

4.2.1 Runways

The adequacy of the existing runway system and requirement for improvements at Sedona Airport were analyzed by examining demand/capacity, runway orientation, length, and pavement strength in conjunction with the prevailing local conditions and the forecast of aviation activity.

Demand/Capacity

The capacity of the runway system to accommodate existing and forecast demand is determined by three statistical measurements. Standard techniques for producing these measurements are derived from FAA Airport Capacity and Delay *(Advisory Circular 150/5060-5)* to include:

- Annual Service Volume (ASV): The number of annual aircraft operations that can be accommodated on a runway system under a full range of airport operating conditions that would be encountered over a year's time.

- Hourly Capacity: The maximum number of aircraft operations that can occur on a runway system in a particular hour under two operating scenarios -- visual flight conditions and instrument flight conditions.

- Aircraft Delay: The average amount of time aircraft will be delayed as a result of a demand/capacity deficit, expressed in minutes per operation or annual hours.

Using information from the FAA advisory circular, the existing ASV for Sedona is estimated at 230,000 operations. As annual aircraft operations approach ASV, the average delay per operation will typically increase rapidly. However, Sedona's projected aviation demand of approximately 62,000 total operations by the year 2017 represents 27 percent of the ASV. Thus, the capacity of the runway is more than adequate through the planning period.

According to *FAA Advisory Circular 150/5060-5,* the estimated hourly capacity for Sedona is 98 operations under VFR conditions (59 operations IFR). This capacity is projected to remain the same through 2017. In comparison, the peak hour demand by the year 2017 will reach 31 operations -- less than one-third of the hourly capacity. This comparison concludes that hourly capacity will not be

reached during the planning period. Further delays associated with Sedona's demand/capacity ratio are minimal, estimated at 0.1 minute per aircraft.

Runway Orientation

The existing runway system at Sedona Airport consists of one paved runway aligned generally northeast/southwest (Runway 03-21). As a general rule, the runway should be aligned with the prevailing winds to minimize crosswind operations. For planning and design purposes, crosswinds are considered excessive when the component of the winds perpendicular to the runway (crosswind) exceeds 15 miles per hour (13 knots) for aircraft over 12,500 pounds gross takeoff weight and at 12 miles per hour (10.5 knots) for smaller aircraft.

The FAA planning standards indicate that an airport should be planned with the capability to operate under year-round wind conditions at least 95 percent of the time. This can often require more than a single runway depending on the wind patterns in the local area. An analysis of historical wind data for 1997 indicates that Runway 03-21 provides 95.68 percent and 97.88 percent coverage for 12-mph and 15-mph crosswind components, respectively. The stronger winds are predominantly out of the north - northeast and favor the use of Runway 03.

Runway Length

The ultimate runway length will determine the types of aircraft that will be able to operate at Sedona Airport. Runway length requirements are based upon four primary factors:

- The types of aircraft expected to use the runway
- The mean maximum daily temperature of the hottest month
- The airport elevation
- The effective runway gradient

As previously discussed, aircraft forecast to operate at the Sedona Airport fall primarily within the B-II classification. For Sedona's projected aircraft types, this includes small aircraft (up to 12,500 pounds, per FAA definition) as well as some large aircraft (greater than 12,500 pounds). The large aircraft forecast to operate at Sedona include various segments of the multi-engine fleet such as business jet and turboprop aircraft between 12,500 and 30,000 pounds.

Table 4-1 presents runway length requirements for specific types of aircraft based on the airport's mean maximum temperature of the hottest month (July, 95.1 degrees Fahrenheit), airport elevation (4,827 feet above mean sea level), and effective runway gradient (1.82 percent sloping downward to the southwest). The runway length requirements described here represent the output from the FAA's Airport Design computer model for runway lengths.

Since Sedona Airport is projected to serve small aircraft, as well as some large aircraft up to 30,000 pounds, two specific lines of output are reviewed for future runway length requirements. These lines reflect lengths of 6,340 feet for 100 percent of the small aircraft fleet and 7,710 feet for 75 percent of the large aircraft fleet (less than 60,000 pounds) at 60 percent useful load. These lengths are identified in bold in **Table 4-1**. Sedona's existing runway length of 5,130 feet serves at least 75 percent of the small aircraft fleet.

Although a runway length between 6,300 and 7,700 feet is desirable, any runway length beyond the existing 5,130 feet is not feasible for two reasons:

1) The Sedona Airport lies on top of a mesa and the existing runway cannot be extended within the confines of that mesa (also discussed in Chapter 5).

   - There are severe terrain drop-offs at each runway end with forest surrounding the site and some residential areas on the north side of the mesa.
   - Fill beyond the existing runway ends is cost prohibitive and impractical.

2) Realignment of the existing runway on the mesa to accommodate a greater percentage of aircraft would impose significant operational disruption and costly landside facility relocations on an already land-constrained airport site. Thus, this option was also identified as cost prohibitive and impractical. (also discussed in Chapter 5). It is important to note that aircraft operating at less than maximum gross weight and/or during lower temperatures require less runway length. Consequently, the existing runway length of 5,130 feet may accommodate a greater percentage of Sedona aircraft operations during such conditions.

Runway Length Requirements

Table 4-1

AIRPORT AND RUNWAY DATA	
Airport elevation	4,827 feet
Mean daily maximum temperature of the hottest month	95.10 F
Maximum difference in runway centerline elevation	94 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles
Wet and slippery runways	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	**4,610 feet**
95 percent of these small airplanes	6,130 feet
100 percent of these small airplanes	**6,340 feet**
Small airplanes with 10 or more passenger seats	6,340 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	**7,710 feet**
75 percent of these large airplanes at 90 percent useful load	9,540 feet
100 percent of these large airplanes at 60 percent useful load	11,940 feet
100 percent of these large airplanes at 90 percent useful load	11,940 feet

Source: Chapter 2 of AC 150/5325-4A, Runway Length Requirements for Airport Design, no changes included.

Runway Width

Runway width requirements are determined based on a combination of aircraft wingspan, approach speed, and runway visibility minimums. Any Runway intended to serve Design Group II aircraft, Approach Category A or B, or have instrument approach minimums lower than 3/4-statue mile should be at least 75 feet wide. Runway 03-21 at Sedona Airport is currently 75 feet wide and should be maintained as such through the planning period.

Runway Pavement Strength

A recent pavement report (see Appendix A) indicates that the runway at the Sedona Airport has a weight bearing capacity of approximately 15,000 pounds single wheel loading (SWL). While the

majority of Group I & II aircraft projected to operate at Sedona Airport are small (under 12,500 pounds), there are some large aircraft, between 12,500 and 30,000 pounds, forecast to operate at the airport within the twenty-year planning period. Therefore, the recommended pavement strength for the runway at Sedona is 30,000 pounds (SWL).

Runway Safety Area and Object Free Area

According to FAA Advisory Circular 150/5300-13, "Airport Design," for airplane design group B-II, the runway safety area (RSA) requirement is 150 feet wide centered about the full length of the runway plus 300 feet off each end. The RSA must be properly graded to specifications and contained on airport property. The RSA serves to protect aircraft undershooting, overshooting, or deviating from the runway. While Sedona's RSA width for the full length of the runway meets design standards, the areas off both runway ends are non-standard as described here:

- Runway 03 end: the ground slopes down by as much as five percent in the first 140 feet from the runway edge. The required maximum slope is three percent for the first 200 feet of the safety area.
- Runway 21 end: similar to Runway 03 end, the terrain drops significantly and continues down the slope of the mountain.

It is recommended that a 'modification to standard' request be submitted by Yavapai County to the FAA for compliance and further evaluation.

The runway object free area (ROFA) requirement for Sedona is 500 feet wide and 300 feet in length beyond the runway end. Unlike the RSA, the ROFA does not have a graded slope. However, the ROFA must remain clear of objects above the runway elevation. Sedona Airport's existing ROFA is adequately clear of objects and meets FAA design standards.

4.2.2 Taxiways

Taxiways are constructed primarily to facilitate aircraft movement between the runway system and the terminal area. Taxiways also provide access between the parking apron and runways as well as relieve traffic congestion and provide efficient circulation around the airfield. Taxiways should also provide the most direct route from the terminal area to the runway in use and there should be a sufficient number of exit taxiways to minimize runway occupancy times. These exit taxiways should be strategically located along the runway for the types of aircraft expected to use the runway. Taxiways at Sedona Airport should be a minimum of 35 feet wide. Taxiways should be designed to have the same pavement strengths as their associated runway(s).

Plans are currently underway for relocation of the existing parallel taxiway from its current 175-foot separation from runway centerline to a 240-foot separation. Once this is accomplished, the runway to taxiway centerline separation will meet B-II standards. In addition, the relocated taxiway will be 35 feet wide with pavement strength of 30,000 lbs (SWL). The existing connecting taxiways will be maintained at their existing width of 40 feet.

4.2.3 Navigational Aids, Lighting and Marking

Navigational and Visual Aids

Navigation aids provide two primary services to airport operations: precision guidance to a specific runway or non-precision guidance to a runway environment and the airport itself.

Airport and runway navigational aid requirements are based upon FAA recommendations as described in AC 150/5300-13, 'Airport Design,' and 7031.2C, 'Airway Planning Standards Handbook.' The basic difference between a precision and non-precision navigational aid is that a precision approach provides electronic descent, alignment (course), and position guidance, while the non-precision navigational aid provides only alignment and position information. The necessity of such equipment is usually determined by design standards predicated on safety considerations and operational needs. The type, purpose and volume of aviation activity expected at the airport are factors in the determination of the eligibility of the airport for navigational aids.

Currently, Runway 03-21 is equipped with Visual Approach Slope Indicators (VASI). VASI's are a system of lights, which provide visual descent guidance information during an approach to the runway. VASI's, or other approved visual approach aids, are adequate for the approach end of the runways.

Runway End Identifier Lights (REILs) are installed to provide rapid and positive identification of the approach end (threshold) of a runway. REILs are typically installed on instrument runways or runways that need a highly conspicuous means of identification due to a complex environment and terrain. Currently, only Runway 03 at the Sedona Airport is equipped with REILs. Since the majority of approaches are on Runway 03, the existing REIL system will adequately serve the planning period demand.

Local traffic information is provided by UNICOM Communication. Albuquerque Air Route Traffic Control Center (ARTCC) in Albuquerque, NM provides traffic control for the area. Radar assistance and advisories are given to pilots who request this service. Prescott Flight Service Station also provides service on weather, flight plans processing, advisories and relay of messages to other stations.

As aviation activity increases and Global Positioning System (GPS) technology continues to be implemented in general aviation airports, instrument approaches to runways may be improved to provide additional capabilities and safety during Instrument Flight Rule (IFR) conditions. A draft Navigational Aids and Aviation Services Special Study by ADOT, dated July 1997 states its preliminary findings of GPS use at Sedona Airport as,

> *"GPS 3 has higher approach minimums than existing NDB or GPS-A. Costs to achieve Runway Object Free Area (ROFA) standards are likely to exceed operational benefit value."*

In contrast, ADOT has more recently stated that their position is to pursue a GPS approach for Sedona in the future. The previous NDB with GPS-A approach to Sedona Airport has been identified as inoperable by the FAA due to the inability to flight check the NDB on several occasions in the past.

The FAA indicated, *"Due to the absence of a reliable NDB signal...the GPS-A and NDB approach procedures cannot be used and are discontinued until further notice."* Further, FAA Western Pacific Region has an "expedite request" into the Flight Procedures Office (FPO) to establish a new

GPS approach as soon as possible (following the completion of a hold-line marking and signage project). Based on the types of aircraft and operations forecast for Sedona Airport, a GPS approach will meet the airport's needs through the planning period.

Airfield Lighting and Marking

The existing runway lighting system at the Sedona Airport is limited to Medium Intensity Runway Edge Lighting (MIRL) on Runway 03-21. This lighting system is recommended for all visual and non-precision instrument runways intended to be used at night or during low light or visibility conditions. Presently, the MIRL system is adequate for the types of operations occurring at the Sedona Airport and no further requirements are anticipated within the planning period.

The current taxiway delineators provide adequate guidance for taxiing aircraft. These reflective markers improve the safety of nighttime aircraft movements on the airport and help eliminate inadvertent taxiing off of paved surfaces; however, Medium Intensity Taxiway Edge Lights (MITL) should ultimately be installed on the taxiways. An MITL system as well as airfield guidance signs are planned for installation with the taxiway relocation project in 1999.

The runway markings at the Sedona Airport are for a visual approach and should be upgraded to a non-precision approach. Visual runway markings consist of runway end numerals to designate direction of landing. A center stripe and edge stripes provide guidance. The main differences between visual and non-precision runway markings are additional threshold and aiming point markings on the runway end.

4.3 LANDSIDE FACILITY REQUIREMENTS

Components of the general aviation landside complex include the following types of facilities:

- Terminal Buildings
- Aircraft Parking Apron
- Perimeter & Security Fencing
- Fuel Storage
- Hangars
- Automobile Parking
- Airport Access
- Utilities

The capacities and capabilities of the various components of the existing terminal area are examined in relation to projected demand to identify future landside facility needs.

4.3.1 Terminal Building Requirements

The terminal building serves several functions. Space required for administrative and management offices, pilot's lounge and flight planning area, meeting facilities, food services, storage rooms, restrooms and various other needs. This space is not necessarily limited to a single building. In the case of the Sedona Airport, most of these facilities and services are currently being provided in the existing 4,600-square foot terminal building, with the exception of food services.

The methodology used to examine terminal building needs generally relates to square footage requirements of design hour general aviation pilots and passengers. For Sedona, the industry average of 1.3 times the total design hour pilots/ passengers was used to determine space requirements based on 100 square feet per pilot/passenger. **Table 4-2** summarizes this calculation for Sedona Airport terminal facilities during the planning period.

Terminal Building Demand/Capacity

Table 4-2

Year	Design Hour Pilot & Passengers	@ 1.3 per design hour	Terminal Space (@ 100 S.F. per design hour)
Capacity	--	--	4,600
1992[1]	22.5	29.25	2,925
1997	20	26	2,600
2002	24	31	3,100
2007	26	34	3,400
2017	33	43	4,300

[1]Demand between 1992 and 1997 dropped when scheduled passenger service was discontinued. Future demand identified for 2002 to 2017 is based on forecasts (does not address possible renewal of scheduled passenger service to Sedona).

As shown in the previous table, the existing terminal building capacity meets demand through the planning period. While this terminal building demand does not address possible scheduled air service, the Sedona Airport Administration and the community represented in the Airport Planning Advisory Committee (PAC) have indicated that they are striving to make the Sedona Airport a viable air service destination in the future. Thus, it should be pointed out that the existing terminal facility did adequately serve scheduled passenger service levels in 1992 (as shown in Table 4-2). Additional discussion of potential scheduled service is presented later.

4.3.2 Hangars and/or T-Shades

The demand for hangar facilities is dependent upon the number and types of aircraft expected to be based at the airport. Actual percentages of based aircraft desiring hangar facilities will vary across the country as a function of local climatic conditions, airport security, and owner preferences. This percentage will also vary with value and sophistication of the aircraft and will typically range anywhere from 30 to 90 percent. Hangar facilities are generally classified as conventional box hangars, T-hangars, or shades. These different types of hangar facilities offer varying degrees of privacy, security, and protection from the elements.

Currently there are 79 hangars, 21 of which are owned by SAA; 50 are private portable T-Hangars and 8 privately owned 'corporate hangars'. Based upon current demands, approximately 90 percent of the airplane owners at the Sedona Airport use hangars. Future demand for hangars indicated in Table 4-2 is based on this 90 percent level. For planning purposes, this percentage breaks down into specific based aircraft types needing hangars as follows: 89 percent of the single engines, and 100 percent of the twin-engine, helicopters, and turbine-powered aircraft.

Further, it was assumed that all individual aircraft storage would occur in T-hangars or small conventional box hangars. T-hangars and T-shades are increasing in demand. "T" types are less expensive than conventional single hangars and provide comparable benefits. However, turbine aircraft require conventional type hangars. Shop and maintenance hangars are considered adequate at this time, but areas for future expansion should be reserved (this will be identified during the alternatives element). FAA Advisory Circular 150/5300-13 guidelines are used to identify hangar needs as shown in **Table 4-3.**

New Hangar Requirements

Table 4-3

Based Aircraft	1997	2002	2007	2017
Single Engine	93	108	116	140
Multi-Engine	7	8	9	11
Rotorcraft	3	3	4	5
Total Based Aircraft	103	119	129	156
Based Aircraft to be Hangared				
89 percent Single Engine	78	96	103	125
100 percent Multi-Engine	7	8	9	11
100 percent Rotorcraft	3	3	4	5
Total Hangared*	**88**	**107**	**116**	**141**
Hangar Demand	**1997**	**2002**	**2007**	**2017**
Number of additional aircraft requiring hangar storage	--	19	9	25
Less No. Aircraft to be stored in Existing (new) Corp. Hangars**	--	4	2	--
Aircraft Balance: Aircraft in individual hangars: Aircraft in large hangars:	--	15 aircraft (11) (4)	7 aircraft (7) (0)	25 aircraft (20) (5)
Total Addt'l Hangars Required: Individual Hangars Large Hangars (2 aircraft per Hangar)	--	**13 hangars** (11) (2)	**7 hangars** (7) (0)	**23 hangars** (20) (3)
Total Addt'l Sq. Footage Required: Individual (1,250 SF each)*** Large (2,000 SF each)***	--	**17,750 SF** (13,750) (4,000)	**8,750 SF** (8,750) (0)	**31,000 SF** (25,000) (6,000)

*There are currently 79 existing hangars for 88 based aircraft. **Newly constructed corporate hangars (large) are currently underutilized. For planning purposes, some future demand is moved to these new hangars. ***Est. hangar sizes are used for planning purposes only.

A planning standard of 1,250 square feet per aircraft was used for individual hangar storage and 2,000 square feet for large hangar storage to accommodate turbine-powered aircraft. Additional conventional and T-hangar facilities will be required throughout the planning period. A total of 43 new hangars are needed at the end of the planning period, which will accommodate 90 percent of the based aircraft forecast.

4.3.3 Aircraft Parking Aprons

Adequate aircraft parking apron should be provided to accommodate based aircraft not stored in hangars as well as transient aircraft under most conditions. The existing Sedona Airport apron/tiedown areas provide aircraft parking for both local and transient aircraft.

Transient aircraft parking should be located nearest the terminal building and fuel facilities for convenience and service, while local parking may be located further away. Local and transient parking areas may be contiguous but should not be mixed, particularly when activity increases.

Transient parking requirements can be determined from knowledge of busy-day operations. While itinerant operations are approximately 33 percent of the total annual operations occurring at the Sedona Airport, it is estimated that transient aircraft (aircraft not based at the airport) conducts 50 percent of busy-day operations and then half of those aircraft require parking concurrently. This results in a transient aircraft parking requirement of 36 total spaces in the year 2017, as shown in **Table 4-4**.

Itinerant Operations

Table 4-4

Year	Total Annual Operations	Busy-Day Operations	Busy-Day Transient Operations	Busy-Day Transient Aircraft	Transient Spaces (@ 50%)
1997	40,897	187	94	47	24
2002	47,224	216	108	54	27
2007	50,816	232	116	58	29
2017	61,932	283	142	71	36

Note: Busy day transient aircraft are assumed to conduct two operations each (one takeoff and one landing).

A planning criterion of 300 square yards per based aircraft and 360 square yards per transient aircraft (small) was used for the apron space requirements presented in Table 4-4. While existing large aircraft parking spaces available now are adequate through the planning period, apron projects under way may impact the location and marking of these large spaces.

The existing total aircraft parking available consists of 81 tiedown spaces. As shown in **Table 4-5**, the aircraft parking requirements are projected to rise from 34 spaces currently to 51 by the year 2017. Thus, the existing capacity more than accommodates the planning period demand. While the taxiway relocation project planned for summer 1999 will slightly reduce the number of parking spaces available on the apron, the net loss will not reduce capacity to less than the 51 spaces required in the year 2017.

Aircraft Parking Apron Requirements

Table 4-5

	Existing			
Apron A @ 360 s.y. per aircraft Apron Area: (s.y.)	61 spaces 27,778			
Proposed Apron A Expansion Apron Area: (s.y)	9 spaces 5,556			
Apron B Apron Area: (s.y)	11 spaces 8,100			
Apron C Apron Area: (s.y)	Impacted by future project 12,800			
Apron D Apron Area: (s.y)	Impacted by future project 5,400			
Apron E Apron Area: (s.y)	Impacted by future project 3,561			
TOTAL spaces/square yards[1]	81 spaces / 41,434 s.y.			
Future Apron Requirements	**1997**	**2002**	**2007**	**2017**
Non-Hangared Based Aircraft (approx. 10% of total based aircraft)	10	12	13	15
Non-Hangared Based Aircraft Needs (300 sq. yds./aircraft)	3,000	3,600	3,900	4,500
Daily Transient Parking Requirements (spaces)	24	27	29	36
Transient Parking Needs (360 sq. yds./aircraft)	8,640	9,720	10,440	12,960
Subtotal Based and Transient Parking spaces and dimensions	34 spaces (11,640 s.y.)	39 spaces (13,320 s.y.)	42 spaces (14,340 s.y.)	51 spaces (17,460 s.y.)
Plus apron area circulation @ 50 percent of parking area[2]	5,820 s.y.	6,660 s.y.	7,170 s.y.	8,730 s.y.
Total Apron Area Requirement (sq. yds.)	17,460	19,980	21,510	26,190

[1]Taxiway relocation project planned for Summer 1999 will reduce the number of parking spaces available on the apron.
[2]Includes adequate area for occasional large aircraft parking on apron based on most efficient apron layout. Physical apron layout drives aircraft parking area requirements; thus, some configurations could drive parking area requirements up.

Further, it is important to note the apron area requirements presented here are calculated for and represent the most efficient layout of aircraft, not necessarily the most functional layout. Apron maintenance is required in accordance with a programmed pavement preservation schedule. For convenience, apron preservation projects should be carried out in conjunction with other pavement preservation projects (e.g., runway, and taxiway). Refer to the Appendix B for Sedona Airport's Pavement Maintenance Management Program.

Helipad-to-aircraft apron separation is designed to maintain a safe separation between helicopter and fixed wing aircraft operations. The existing helipads west of Apron A, (built in 1997) can accommodate transient and based helicopter activity well beyond the planning period.

4.3.4 Automobile Parking

Public and reserved parking requirements at the Sedona Airport are based upon the future needs of several airport users (tenants, fixed base operators, etc.). At the present, the concessionaires at the terminal are not accommodated in the existing automobile parking facilities. There are 29 paved public spaces at the terminal building and an additional 18 paved spaces located at the entrance to apron E and next to aircraft hangars.

The requirements for short-term daily public vehicle parking were determined by calculations similar to the terminal facility calculations. The total number of parking positions are usually projected on a basis of 1.3 spaces per design hour pilots/passengers and 350 square feet per parking space. For rental car space requirements, FAA guidelines in Advisory Circular 150/5360-9, "Planning and Design of Airport Terminal Facilities at Non-hub Locations", were applied. Future employee automobile parking is projected based on the current 30 percent utilization rate. At the expiration of the present lease in 2006, it is possible that several of the existing concessions, i.e., restaurant, scheduled air service and others, will be relocated to the terminal building. See **Table 4-6** for automobile parking requirements.

Automobile Parking Requirements

Table 4-6

Design Hour Pilots and Passengers (DHP)					
	1997	**2002**	**2007**	**2012**	**2017**
	40	48	52	58	66
Public Auto Parking Requirements (@ 1.3 times DHP, in spaces)					
Existing	*1997*	*2002*	*2007*	*2012*	*2017*
47	52	62	68	75	86
16,450 s.f.	18,200 s.f.	21,700 s.f.	23,800 s.f.	26,250 s.f.	30,100 s.f.
Rental Car Parking Requirements (@ 20 percent, in spaces)					
Existing	1997	2002	2007	2012	2017
	10	12	14	15	17
	3,500 s.f.	4,200 s.f.	4,900 s.f.	5,250 s.f.	5,950 s.f.
Employee Parking Requirements (@ 30 percent, in spaces)					
Existing	1997	2002	2007	2012	2017
	16	19	21	23	26
	1,750 s.f.	2,100 s.f.	2,450 s.f.	2,800 s.f.	3,150 s.f.
TOTAL PARKING REQUIREMENTS					
Existing	1997	2002	2007	2012	2017
47	**78**	**93**	**103**	**113**	**129**
16,450 s.f.	27,300 s.f.	32,550 s.f.	36,050 s.f.	39,550 s.f.	45,150 s.f.
	+31	**+46**	**+56**	**+66**	**+82**

In the future, all subsequent landside development should provide adequate parking for its operations in the vicinity of the development it serves (addressed further in the alternative analysis and airport plan elements). The existing parking areas, in accordance with the demand/capacity analysis, is not adequate to meet requirements through the timeframe of this study. However, there are presently planned projects underway to accommodate some of the parking deficiencies.

4.3.5 Airport Boundary and Security Fence

Airport Boundary

As discussed in the Inventory Chapter, there is a property boundary discrepancy of approximately 11.2 acres, which appears to be owned by the Forest Service rather than Yavapai County. Previous sources of property information indicated the subject acreage was part of the property originally deeded to the County. While only a small part of the property in question contains existing airport facilities, the preferred airport development alternative reflects additional development on part of this 11.2-acre parcel. Yavapai County is currently working with the Forest Service to resolve the issue through one of the following or similar procedures.

- **Abandon Existing Development:** This is not recommended due to the impact it would have on the operational aspects of the airport as well as the recommended development.

- **Land Exchange:** The property needed for airport purposes could be conveyed from the Forest Service to Yavapai County in exchange for other property that has been deemed unsuitable for airport purposes, but is acceptable to the Forest Service. This would be accomplished in accordance with CFR Title 36, Chapter 2, Part 254 Subpart A.

- **Transfer of Property**: The property may be transferred to the County under the Townsite Act as outlined in CFR Title 36, Chapter 2, part 254 Subpart B or under CRF Title 14, Section 23 of the Airport And Airways Development Act of 1970 and subsequent CFR Title 14, Section 516 of the Airport And Airways Improvement Act of 1982.

- **Exchange or Sale:** The land could be conveyed from the Forest Service to the County under CFR Title 36, Chapter 2, Part 254, Subpart C - Conveyance of Small Tracts.

Until this property issue is resolved, the airport layout plan and property map drawings will only note the property discrepancy and the fact that Yavapai County is in the process of resolving it.

Perimeter and Security Fencing

Currently, the Sedona Airport is completely bounded by an eight-foot high chain link fence topped with three-wire, double-strand barbed wire. Although the fence does not follow the airport boundary in all areas, the rugged terrain of the mountain slopes makes it unnecessary and impractical to place the fence on certain extreme portions of the property. The fence was installed to reduce both public and wildlife incursions. The existing chain link fence topped with barbed wire is adequate for the planning period. In addition, policies to prevent further incursions should be addressed by the airport with respect to gate use and fence maintenance.

The FBO's leasing property does not have security fencing. The installation of fencing, lighting or other security-related measures for these leased properties is the responsibility of the individual FBO's in accordance with their lease agreements.

4.3.6 Airport Access

Based on the operational forecasts for the Sedona Airport, access to the airport is adequate. Yavapai County widened the two-lane 'Airport Road' in 1991 and installed a guardrail for improved safety and traffic flow. However, there is great concern with the additional traffic and parking that occur at the scenic overlook area near the airport entrance.

The public in the overlook area presents several safety concerns including restricting access to the airport during short periods of time. The County and the Airport Administration need to address these issues and provide other alternatives.

Improved internal airport circulation should be addressed in association with proposed landside improvements. This will be addressed in the alternative analysis element of the Study.

4.3.7 Fuel Storage and Fueling Facilities

Fuel consumption is directly related to the operational activity at an airport. General aviation fuel storage requirements typically average approximately 5.0 gallons per operation. Fuel storage capacity was calculated based on provision of a two-week supply of fuel during the peak month of activity. These requirements are shown in **Table 4-7**. At present aircraft fuel facilities at the Sedona Airport include two (2) 10,000-gallon aboveground storage tanks, one for Jet A and the other for AVGAS.

Fuel Storage Requirements

Table 4-7

Year	Annual Operations	Peak Month	½ Peak Month Ops	Gallons per Operations	Fuel Storage (gals)
Capacity	**66,667**	**8,000**	**4,000**	**5.0**	**20,000**
1997	40,897	4,907	2,453	5.0	12,265
2002	47,244	5,669	2,835	5.0	14,175
2007	50,816	6,098	3,049	5.0	15,245
2017	61,932	7,432	3,716	5.0	18,580

The table shows existing fuel storage and fueling facilities of two (2) 10,000-gallon aboveground storage tanks operated by the Sedona Airport Administration are adequate for the time period of the Master Plan. Adequate fuel storage capacity lessens the effect of spot shortages and allows the airport to take advantage of price fluctuations.

4.3.8 Fire Fighting

As indicated in the Inventory Chapter, the airport has a water system for Phase 1 Fire Protection, which provides 100,000 gallons in storage. The Fire Chief estimates that in the future, an additional 100,000-gallon tank will be needed. An additional 100,000-gallon tank has been programmed.

4.3.9 Utilities

Water

The existing water and waste water systems were examined for their capacity to meet the long-term demands of the airport. The existing water system is a six-inch water main that supplies water to the terminal building. Oak Creek Water Company #1 provides domestic potable water through a separate set of water lines and has adequate capacity for current demands. However, the existing water system ends at the terminal building and should ultimately be connected and looped to provide consistent pressure and continuous service as development occurs on the airport and if the water company has the capacity.

Sewer

The existing sewer system is adequate to serve the existing needs. Most of the buildings at the airport have sewage facilities, which drain to individual septic tanks and seepage pits; however, as additional hangars and facilities are built, additional sewage facilities may be required subject to environmental rules. It is important to note that the City of Sedona has stated that there may be restrictions regarding any increase in portable sewage facilities and/or new septic systems at the airport. This issue requires future coordination between SAA, the City and Yavapai County.

Drainage

The drainage system consists of numerous culverts on the airport, including a series of culverts under connector taxiways, between the parallel taxiway and runway, and under the taxiway connections to the aprons. As airfield projects are completed, additional culverts will be built. At this time, the existing drainage system, which runs generally from northwest to southeast, is adequate within the planning period.

Gas

There are no natural gas lines at the Sedona Airport. Each facility at the airport has its own propane gas system. Additional propane systems may be added as new facilities are built, however, current systems are adequate.

Electric

Arizona Public Service (APS) provides electrical service. The airport is equipped with three phase electric power. Information on specific power service capacities and facilities was not available, but given the relatively small power requirements of the airport, current capacity appears to be adequate. Future power requirements for the airport will not significantly increase power demands and no electrical system improvements will be necessary for airport purposes.

Telephone

US West Communications provides telephone service. Discussions with airport management revealed that existing telephone facilities are more than adequate to meet all existing and anticipated future service requirements.

4.4 POTENTIAL SCHEDULED AIR SERVICE

4.4.1 Introduction

Golden Pacific Airlines was the original scheduled service and was discontinued in 1988. Air Sedona, (later Scenic Airlines) a charter and tour service, provided scheduled service to Phoenix from 1984 until August 1995. As mentioned in the previous Inventory Chapter, Sedona Airport's history of air service reveals what potential scheduled operations may be accommodated at the airport in the future. A recent Draft Arizona Air Service Study by ADOT, Aeronautics Division, also indicates "Sedona is demographically an affluent market with a definite need for air travel."

For Sedona Airport to accommodate future needs of scheduled air service, FAA rules for operating must be established. Terms and definitions associated with scheduled service are included in the appendix.

4.4.2 Facility Requirements for Potential Air Service at Sedona Airport

Based on Sedona's high level of visitor and tourist demand and according to ADOT's 1998 *Arizona Air Service Study*, "it is estimated that this airport may be able to capture 15 percent of its total unconstrained demand...approximately 6,284 potential enplanements." Assuming that air service is initiated, the following provides a cursory review of what this means to Sedona Airport in terms of facilities bearing in mind that factors such as aircraft fleet and destination routes may vary facility needs.

Runway

At 5,130 feet, the runway length limits passenger-carrying aircraft (based on current aircraft aircraft technology and performance) to 10 seats or less.

Aircraft Parking Area

One or two of the four large aircraft parking spaces recently designed for the apron area would accommodate parking for scheduled air service aircraft.

Terminal Building

Terminal building requirements are estimated at 2,300 square feet. This is based on the assumption that the design hour would consist of the following:

- 9 passengers embarking
- 9 passengers disembarking
- 5 "meeters and greeters" (50 percent of passengers disembarking)
- 100 square feet per person in the terminal

A security screening area is not included in this calculation due to the uncertainty of air service destinations. However, in some cases, if the flight is destined for a "sterile" area, a passenger-screening area is required at the place of origination. Thus, certain commuter routes may dictate additional space needs to accommodate screening and staging of carry-on baggage.

Security

Security will be a growing concern as scheduled commuters are reintroduced. Meeting the security needs will require the involvement of the airport administration, operating airlines, FAA, Police, Security services, labor unions, and government departments. The following briefly summarizes the security issues to be addressed:

- Airside (defined as the movement area of the facility to which access is controlled) security procedures must be identified.
- Fencing must provide multiple functions: (1) clearly define the protected areas, (2) deter intruders, (3) delay or inhibit unlawful entry, (4) provide defined controlled access points at gates.
- Measures, such as the identification of persons and vehicles, must also be used to secure the airport and its users from potential terrorist or harmful individuals. Clear and distinct uniforms or form of identification must be established.
- Aircraft isolation area should be designated on the airfield in the event of sabotage. FAA regulations mandate at least 328 ft. from any other aircraft parking, building, public areas or utilities.

Auto Parking

As previously discussed, 350 square feet was established per automobile space. In this scenario, if 100 percent of passengers need a parking space, an additional 18 parking spaces will be needed. This would be an additional 6,300 sq. feet of parking area needed.

Crash, Fire and Rescue

FAR Part 139 indicates that a lightweight vehicle must be able to reach a midpoint of the farthest runway from its assigned post within three minutes from the time the alarm is sounded. The second vehicle must be able to fulfill the same requirements in four minutes and any subsequent vehicle in four and a half minutes. A potential ARFF location is shown in the following Alternatives Chapter and on the Airport Layout Plan.

Fuel Storage

Fuel Storage can be measured when specific information is given about the scheduled service being introduced to Sedona Airport. The fuel storage capacity listed in prior sections is primarily for general aviation use. If scheduled service is introduced, it is anticipated that the airport's current storage capacity could more than accommodate the increased fuel requirements.

Utilities

As the need for more terminals and facilities are developed, utility requirements are going to be identified. The current septic tank system is inadequate for any future expansion. As mentioned previously, additional systems or other alternatives need to be considered by the City of Sedona and/or Yavapai County to accommodate future development facilities.

4.5 SUMMARY

As aviation activity increases at the Sedona Airport, certain airport facilities will need to be improved or expanded. Several deficiencies have been identified in some of the facilities currently available at the airport. Principal among these is the need for additional aircraft storage hangars and automobile parking, improved internal airport circulation, increased water storage, and the need to resolve the property boundary discrepancy between Yavapai County and the U.S. Forest Service. The existing aircraft hangar and auto parking deficiencies will become more prominent in the future as activity at the airport increases. Therefore, measures must be taken to alleviate these deficiencies and accommodate future aviation activity. Airside deficiencies include the runway length and safety area. Based on the topographical limitations and land-constrained airport configuration, there are no viable future airside development projects to remedy these non-standard conditions. Pavement preservation is the primary concern with respect to airside facilities.

In planning the future of Sedona Airport, the widest possible range of operating requirements and capabilities have been retained. This will provide maximum flexibility to develop the airport beyond the projected needs and the ability to respond to unforeseen events. This "built-in" flexibility can be achieved without sacrificing utility or economy, or over designing airfield facilities. However, it should be noted that unforeseen external factors might impose physical, technical, or economic constraints on the recommended airport development.

The recommended development will not only improve or correct existing deficiencies, but also provide the modern and efficient facilities necessary to attract and encourage additional development and services. The next step in the master planning process is to analyze various alternatives capable of providing the necessary facilities. Chapter 5 will examine several alternatives, assess their relative strengths and weaknesses, and recommend a development plan for the future Sedona Airport.